CHAPTER 27

HOSELINE OUTFIT

DESCRIPTION

The hoseline outfit, also called the assault hoseline, is a temporary system to carry bulk petroleum. It is designed so that it can be quickly moved to a new site and easily installed. It can transport fuel at a rate of about 350 GPM across rolling country. The hoseline outfit consists of 13,000 feet (about 2.5 miles) of 4-inch collapsible hose packed in flaking boxes, a 350-GPM pumping assembly, a flow control kit, a roadway crossing guard, a hoseline suspension kit, a hoseline assembly, a hoseline packing kit, and a repair kit. Detailed information on the layout and operation of the hoseline outfit is covered in Section II of this chapter.

Hose and Flaking Boxes

The 4-inch, lightweight, collapsible rubber hose is packed in 13 flaking boxes with 1,000 feet to a box. Each 1,000-foot section consists of two 500-foot lengths joined together with an aluminum grooved coupling. A swivel joint with grooved ends is attached to one end of the assembly. This joint lets the hose assembly rotate continuously at the swivel connection. The hose is black with a yellow lay line. Figure 27-1 shows how the hoseline is packed in the flaking boxes. Three to five full flaking boxes are usually on a truck. However, this depends on the type of truck available and the terrain the truck must cross to lay the hoseline. Each box nests into the one below it, and each has retainer pins to keep it from shifting. There are two types of hose retainers. One is a removable plywood closure shown in Figure 27-1 which, is placed over the two ends of the box. The other is a fabric retainer which replaces the plywood closures when the hose is being let out from the box.

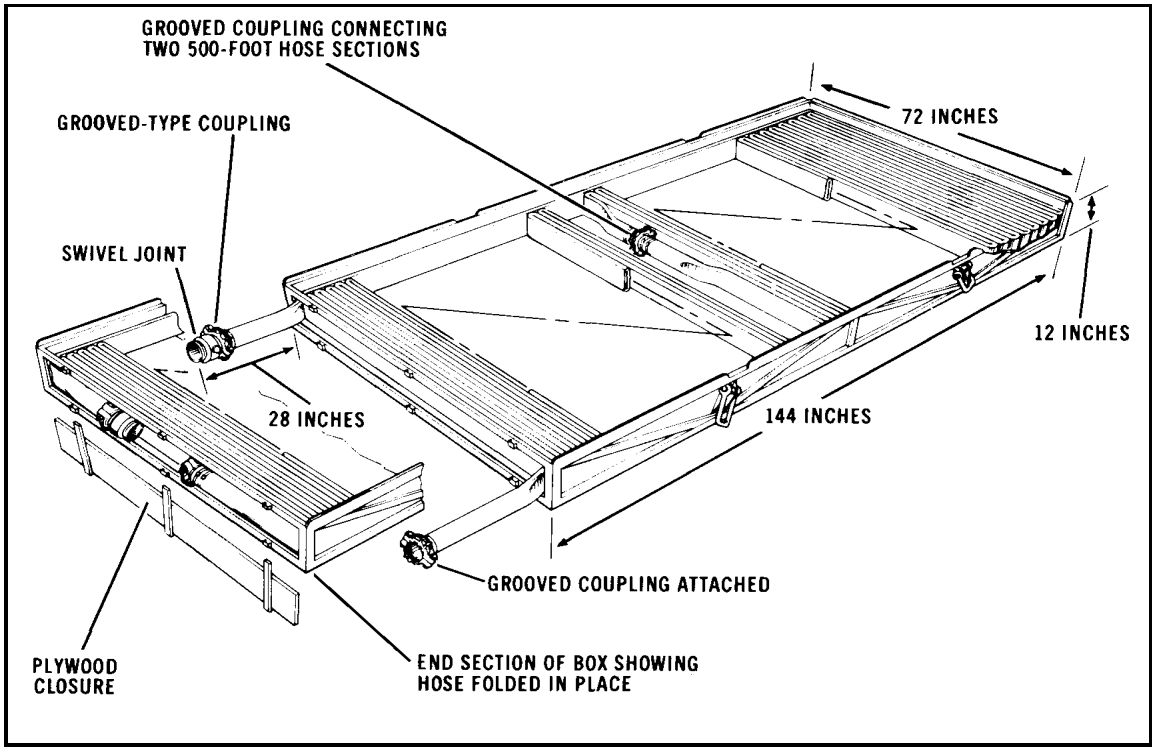

Figure 27-1. Hose packed in flaking box

The 350-GPM Pump Pressure Regulator

The 350-GPM pump that comes with the hoseline outfit is equipped with a pressure regulator. The regulator controls the idle of the pump. It adjusts the pressure if there is a significant increase or decrease in pressure in the hoseline.

Flow Control Kit

The flow control kit consists of two 4-inch gate valves; one 4-inch T; two check valves; two 4-inch hose assemblies (each 5 feet long); one strainer assembly; one roll of electrician's tape; and couplings, nipples, adapters, and coupling halves. These items are stored in a metal chest when not in use. The kit is used to control the flow of fuel in the hoseline. This is done by installing the various components in the hoseline at desired locations.

Roadway Crossing Guard

The roadway crossing guard as shown in Figure 27-2 must be installed to protect the hoseline when it crosses a roadway. Figure 27-3 shows a roadbed with the crossing guard installed.

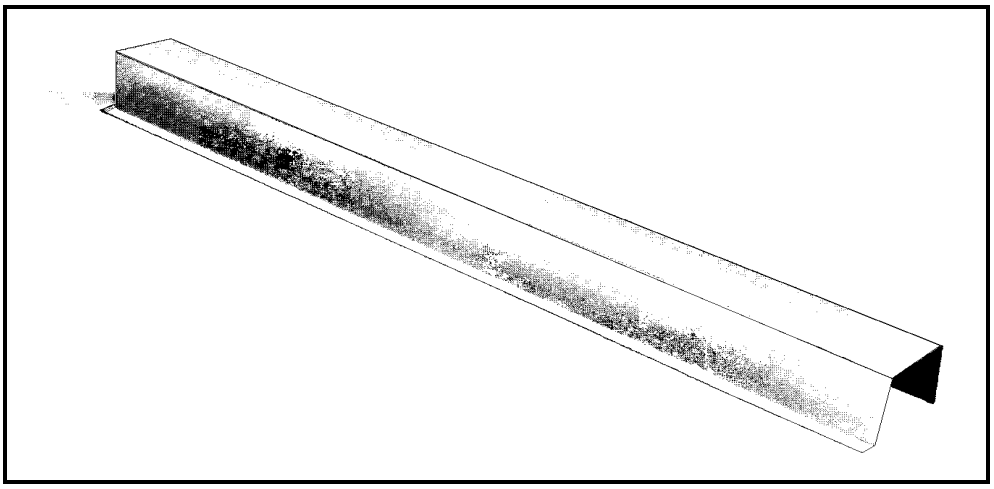

Figure 27-2. Roadway crossing guard

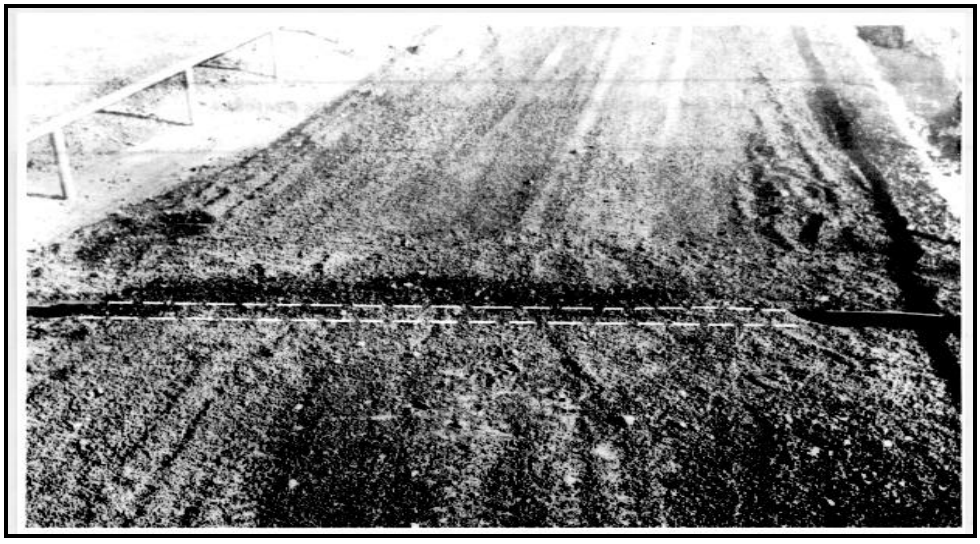

Figure 27-3. Roadway crossing guard installed on roadbed

Hoseline Suspension Kit

The hoseline suspension kit consists of 350 feet of wire rope, 350 feet of manila rope, 25 wire-rope clips, 60 shackles, 60 hose saddles, 14 steel pickets, 4 steel blocks, 4 turnbuckles, and 4 wire-rope thimbles. These items are stored in a metal chest when not in use. The kit is used to suspend segments of the hoseline system over streams or uneven areas as shown in Figure 27-4.

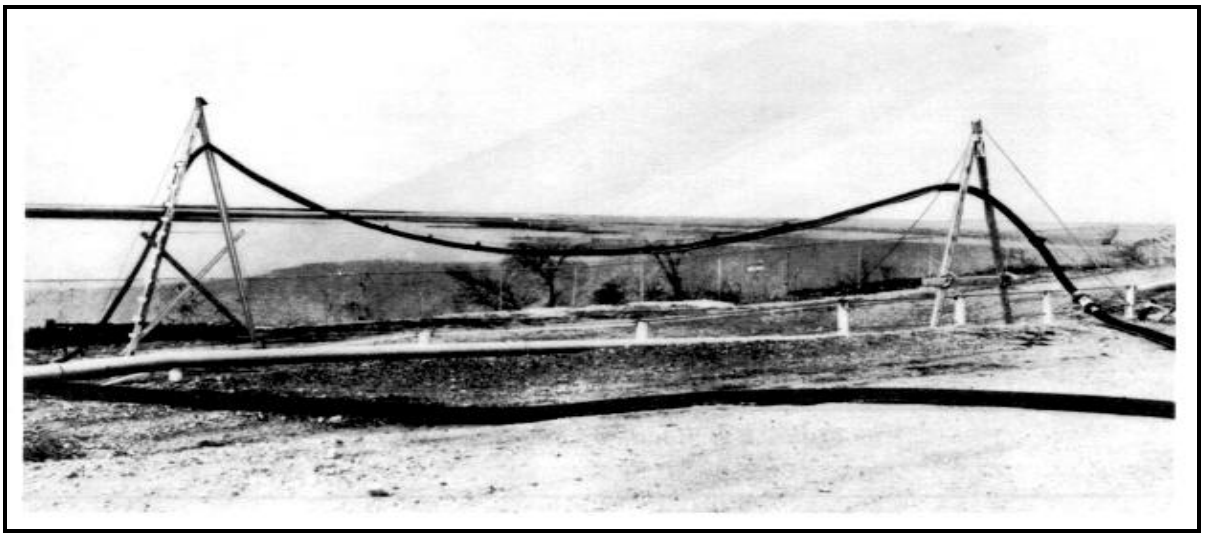

Figure 27-4. Suspension kit used with hose line system

Hoseline Displacement and Evacuation Kit.

The hoseline displacement and evacuation kit as shown in Figure 27-5 consists of a ball injector, a ball receiver, a displacement ball, an air eductor, 8 grooved couplings, and 16 pipe caps. It also has a metal storage chest. The kit is used to remove liquid fuel, vapors, and air from the hoseline system. It also flattens the hose so that it can be easily packed into flaking boxes.

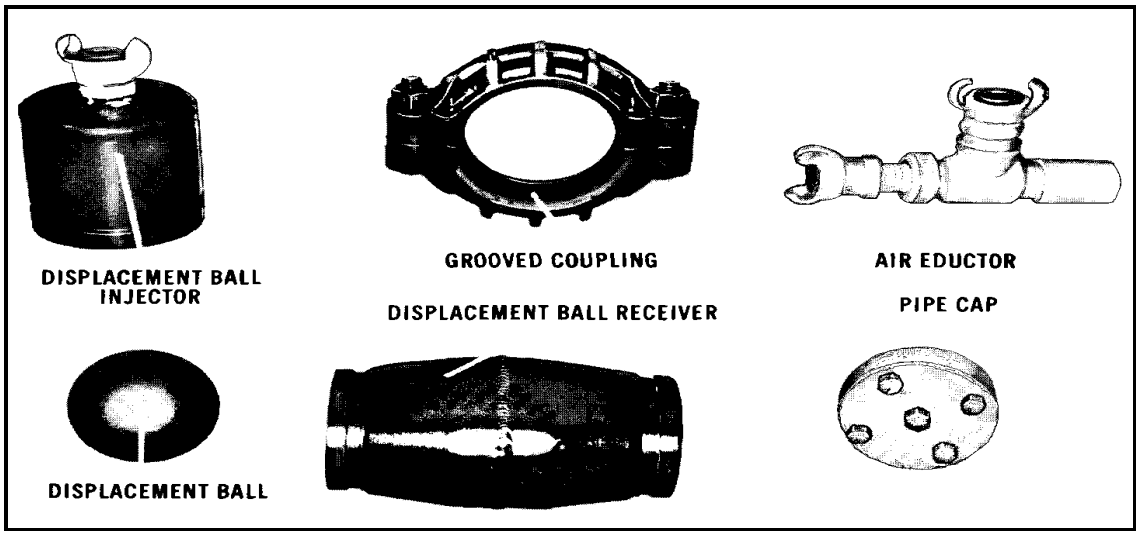

Figure 27-5. Hose line displacement and evacuation kit

Sling Assembly

The sling assembly as shown in as shown in Figure 27-6 is used to lift and handle flaking boxes. The four-leg lifting sling is equipped with a spreader bar. The assembly can lift up to three full flaking boxes at a time, but it will be damaged if it lifts more than three.

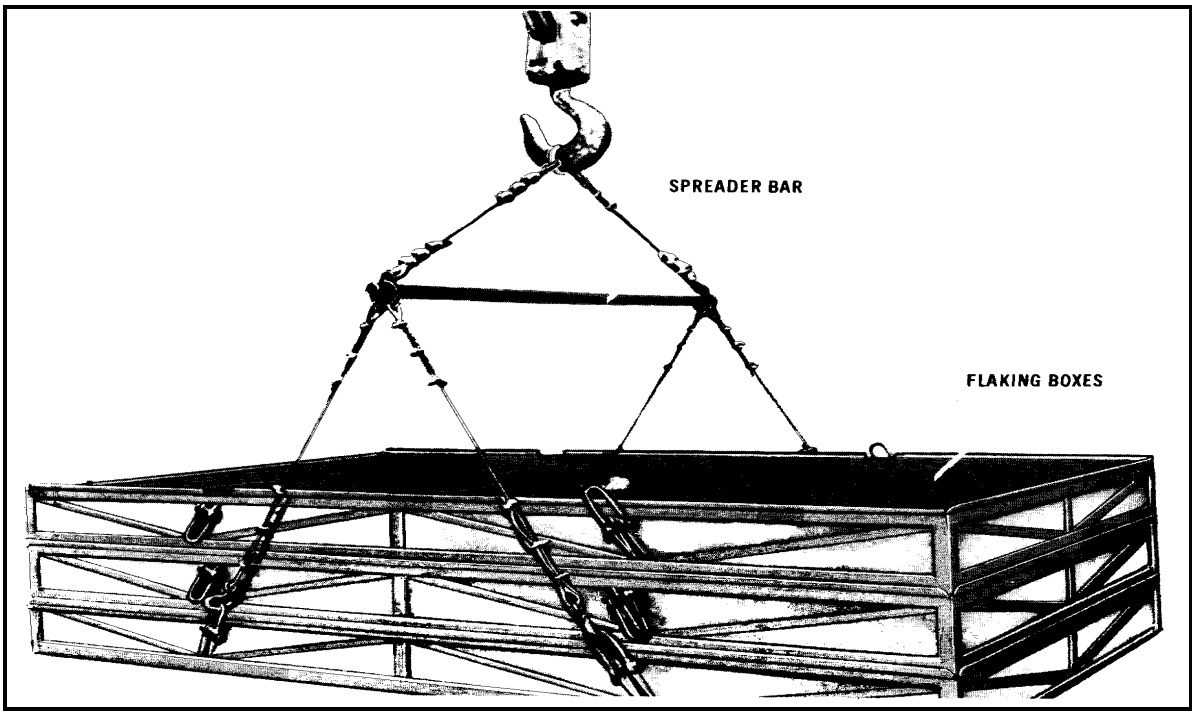

Figure 27-6. Sling assembly

Hoseline Packing Kit.

The hoseline packing kit consists of a chain hoist, a hose puller, two hose clamps, and a metal storage chest. The kit is used when packing sections of the hoseline system into the flaking boxes as shown in Figure 27-7. It is generally used when temperatures drop below 40°F. Below 40°F, the hose becomes less flexible and harder to pack.

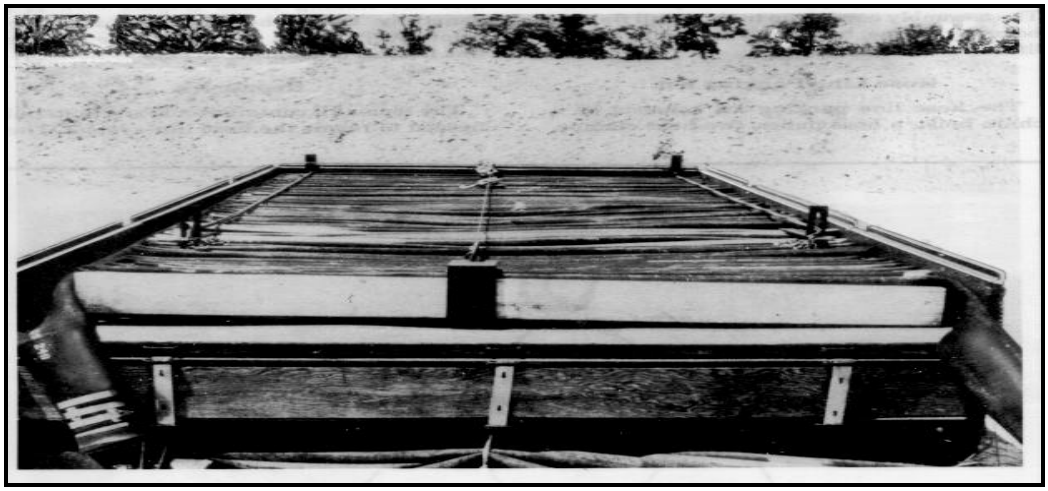

Figure 27-7. Hose line packing kit being used

Repair Kit

The repair kit contains tools and materials needed to repair the hoseline system. They are stored in a metal chest when not in use. Table 27-1 lists the components of the repair kit.

Table 27-1. Components of the repair kit.

COMPONENTS	QUANTITY
Hose clamps	4
Grooved-to-hose adapter	10
Banding buckles	100
Solvent (1-pint can)	3
Hammer	1
Rubber tape	150 feet
Socket wrench and handle	1
Knife	1
Tape	350 feet
Screwdriver	1
Rubber adhesive (8-ounce can)	5
Grooved couplings	8
Banding tool	1
Banding strap	200 feet
Rags	20 square feet

USE

The hoseline outfit is used to transport bulk petroleum in a variety of ways. The outfit can be temporarily connected to a rigid pipeline for bulk delivery of petroleum to FSSPs. Where railroad transportation ends, the hoseline outfit can be connected to railway tank cars to transport bulk fuel to Class III supply points or storage terminals. The outfit can also be used at an airhead complex where bulk supplies are delivered by aircraft equipped with the ABFDS.

LAYOUT

After you have set up the Class III supply point and started operations, you may be required to lay out the hoseline outfit. Follow the procedures below to lay out the hoseline outfit.

Choosing a Route

Select a direct route which is free of obstacles. If possible, try to parallel an existing road to aid construction, operation, and security. A route parallel to a secondary, all-weather road is better than a heavily traveled main supply route. If the road you choose winds a lot, make a cross-country cutoff. Bypass difficult terrain such as marshes, swamps, and water courses. Also, avoid thickly populated areas. Take advantage of natural cover such as fence lines, woods, and hedgerows. However, do not disturb the natural cover by grading or leveling. Try to avoid rocky areas which might damage the hose.

Loading Boxes

You can load three to five flaking boxes on one truck. Use the sling assembly Figure 27-6, page 27-4**,** to load them. Do not use a forklift truck because this puts a lot of stress on the boxes and may damage them. Ensure you nest the boxes properly when you load them, and make sure the retainer pins are in place. Secure the stack of

boxes on the truck to keep them from sliding. Leave the plywood closures as shown in Figure 27-8 in place during loading and transporting. When you get to the distribution point, take the plywood closures off and replace them with fabric retainers. These retainers automatically break away when the hose is pulled from the box. Keep them for future use. Before you start distributing the hose from the flaking boxes, connect the tail coupling on the top box to the lead coupling of the box below it. Do this until you have connected all the hose couplings on the truck. This lets you play out the whole truckload of hose without stopping to make connections.

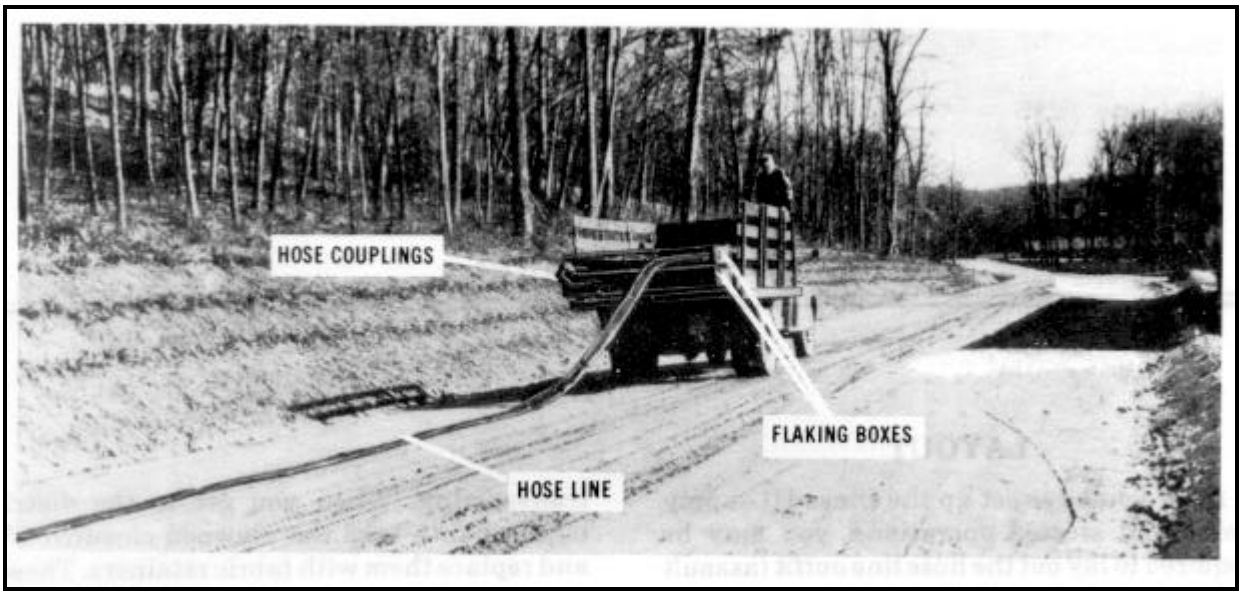

Figure 27-8. Laying the assault hose line on a road

Distributing Hose

To start laying the hose, pull out the lead end of the hose from the top flaking box and hold it on the ground while the truck moves forward. When 100 feet are pulled from the truck, there is no longer any need for you to hold back the hose because its weight on the ground is enough to keep it from being dragged along by the truck. As the truck moves forward, the hose automatically comes out of the flaking boxes. You can play out the hose at speeds up to 35 MPH; however, a speed of no more than 20 MPH is recommended. As you lay the hose, walk along the line and straighten out kinks or binds and remove small obstructions which might damage the hoseline on a road Figure 27-8. Pick up the hose and move it to the road ditch or to a bank across the ditch. Never leave the hose on the roadway.

Crossing Streams.

There are several ways you can lay the hoseline across a stream or watercourse. If there is a bridge, suspend the hoseline on improvised brackets outside the bridge railing. If there is no bridge, you may lay the hoseline directly in the streambed if it is narrow and not apt to flood. Use the hoseline suspension kit, as shown in Figure 27-4, page 27-3, to cross a wide stream. Fabric saddles as shown in Figure 27-9, page 27-7**,** with eyes for easy wire attachment come with the kit.

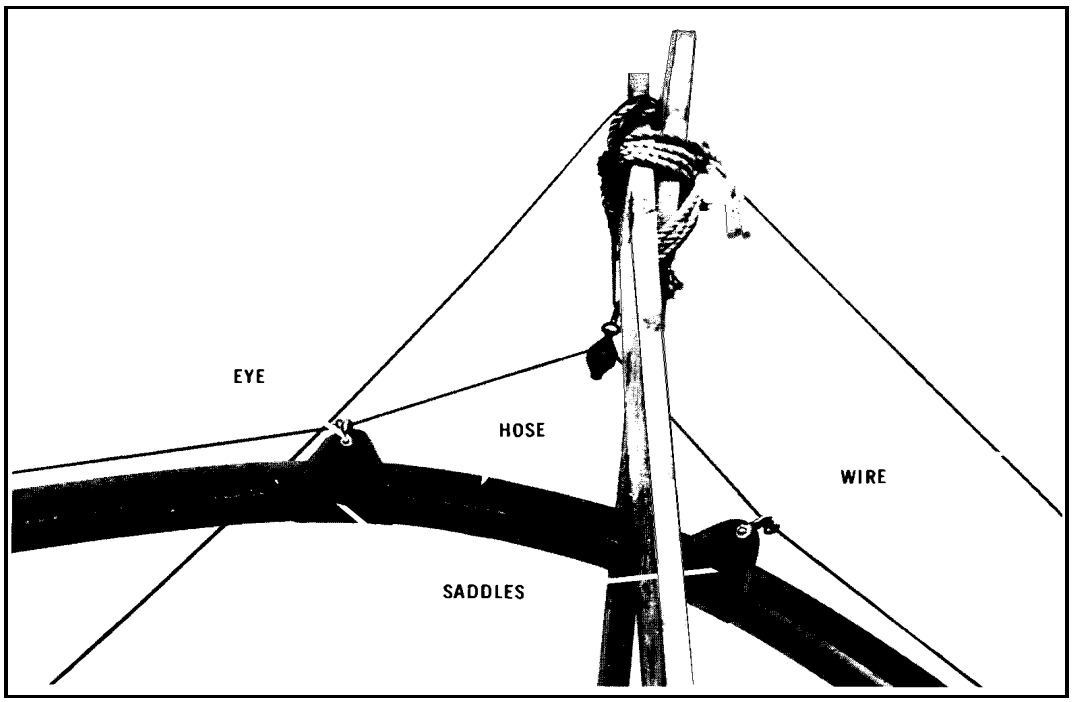

Figure 27-9. Fabric saddle used in hose line suspension kit

Crossing Gaps

You should also use the hoseline suspension kit to span small gaps with steep sides. For a wide crossing, build a suspension bridge with a flat deck or floor to hold the hose. This eliminates the sags that occur when the suspension kit is used.

Crossing Roads

To cross a highway or railroad, run the hoseline under a bridge or through a culvert, if possible. You can pull the hoseline through the culvert with a rope or push it through with a piece of lumber or a small-diameter pipe. If there is no bridge, install the roadway crossing guard Figures 27-2, page 27-2, and 27-3, page 27-2**,** to protect the hoseline. Never bury unprotected hoseline in a railroad. When crossing a railbed, you can either install a piece of heavy wall pipe in a shallow ditch under the rails or suspend the hose over the railbed at a suitable height. As soon as possible, replace the hoseline at a railway crossing with welded pipeline because of the fire hazards caused by trains.

PUMPING STATIONS

Assault hoseline pumping stations have one 350-GPM pumping assembly. If you are using only one hoseline outfit, place the pumping assembly at the beginning of the hoseline system. Because this pump does not have a pressure-regulating device, you must monitor it at all times for changes in hoseline pressure. You must set up pumping stations when you connect several hoseline outfits together. There is a formula you can use to locate pumping stations on level ground using motor gasoline in the hoseline. If you use a product other than motor gasoline, the distance between pumping stations (given by this formula) changes. For example, if you use a product heavier than motor gasoline, the pumping stations should be closer together. If the product you use is lighter than motor gasoline, the pumping stations should be farther apart. The distance between pumping stations (given by this formula) also changes with the height of the terrain. For example, if you place the hoseline on an uphill slope, the pumping stations should be closer together. If you place the hoseline on downhill slope, the pumping stations should be farther apart.

PRESSURE-REDUCING STATIONS

When you place the hoseline on a steep downhill slope for some distance, there may be more pressure on the hoseline than it can take. If this occurs, install a pressure-reducing station in the line to relieve the pressure. The station consists of a regulating (receiving) storage tank.

CHECK VALVES

Install check valves as shown in Figure 27-10 (they are part of the flow control kit) in the hoseline system to keep the fuel from flowing back when you stop the pumps. You usually have a backflow when your hoseline sections are on an uphill slope. The check valve has a hinged disk which closes when the fuel flows in the wrong direction and pushes against it. Put your check valves at the downstream end of the pump discharge manifold and near the bottom end in hoselines on uphill slopes.

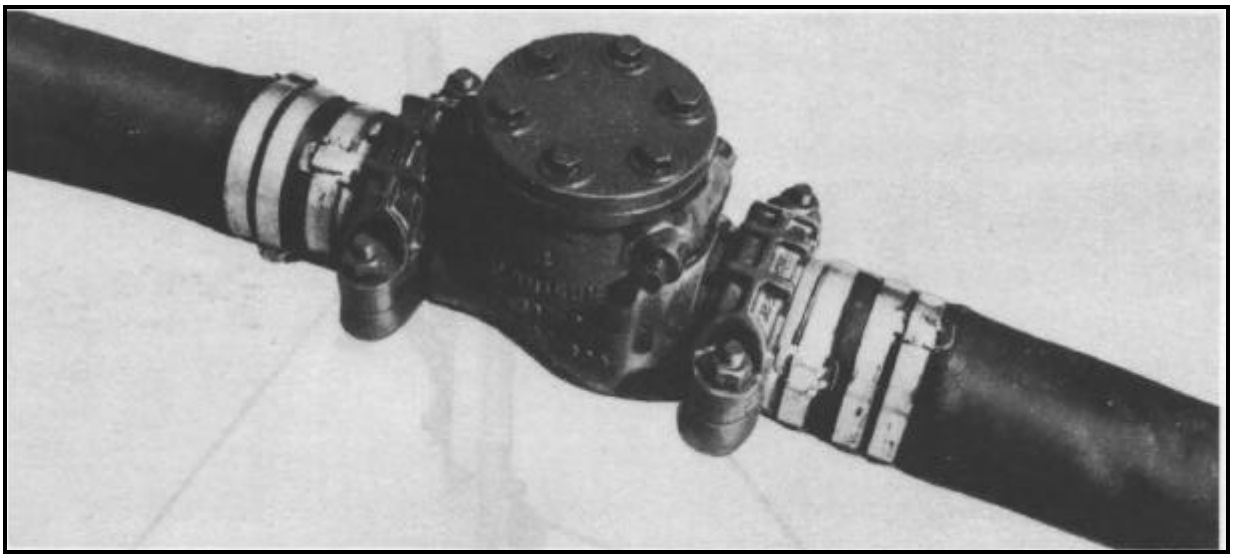

Figure 27-10. Check valve installed in the hose line

HOSELINE TESTING

Once you have set up the assault hoseline, fill it with fuel and run a pressure test to check for leaks. Start the pumps slowly, and raise the fluid pressure in the system gradually in increments of 50 PSI. Hold the pressure each time you raise it, and inspect the hoseline for leaks. Keep doing this up to and including 150 PSI. Even though the design burst pressure of the hose is higher, your test should not exceed the rated safe working pressure of 150 PSI. If the line pressure does not build up, stop the pumps because the line probably has a leak. You can usually fix leaks at couplings, fittings, or valves by tightening, adjusting, or replacing gaskets.

HOSE REPAIR

Leaking and broken hoses need to be repaired as soon as possible. Follow these steps to repair the hose:

Leaking Hose

Use the repair kit to fix seeping or fine spraying leaks which occur in the hose wall during testing or use. Fix them at once so that they do not break the hose.

- Reduce the pressure in the hoseline. This cuts down on the fuel coming out of the leak.
- Clean an area about 6 inches wide on each side of the leak with solvent. If you do not have any solvent, wipe the area clean and dry.

•Apply a thin coat of rubber adhesive to this area, and let it get tacky. This takes about five minutes.

•Cover the adhesive area with a spiral wrap of 2-inch-wide rubber tape. Overlap each wrap about 1 inch.

•Apply two spiral wraps of 2-inch vinyl-plastic tape to the area in the opposite direction. Wrap the tape as tightly as you can without causing the hose to buckle.

•Keep some pressure on the hose so that it stays cylindrical. A tape patch is shown in Figure 27-11.

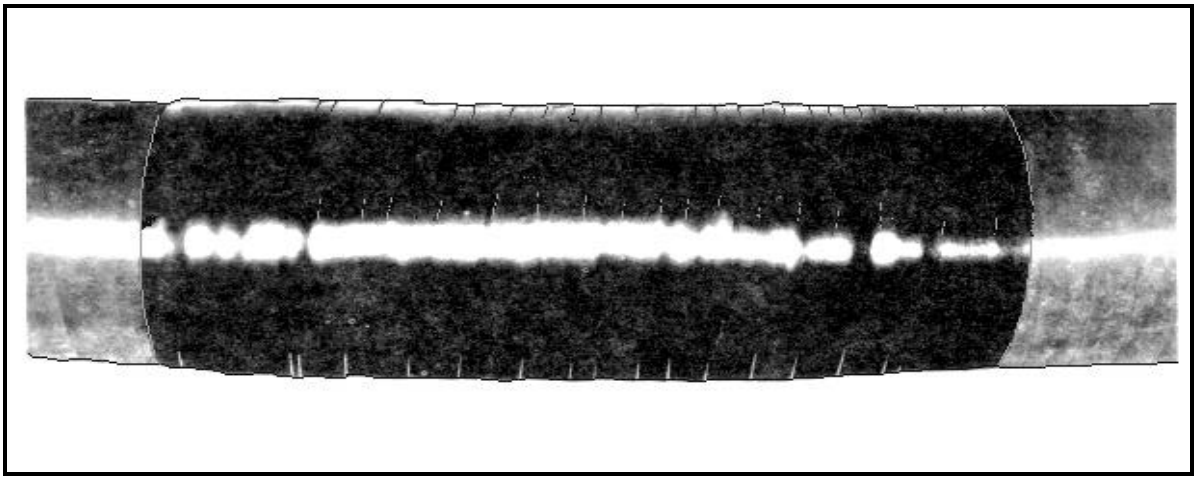

Figure 27-11. Completed tape patch

Broken Hose

To repair breaks, splits, or punctures in the hose wall, cut out the defective area and join the cut ends with two coupling sleeves and a coupling. You can repair only collapsible hose in this way because suction or hard wall hose has a wire wrap on the inside which makes cutting almost impossible.

•Shut down the system and ensure there is no pressure in the hoseline.

•Put a hose clamp (from the repair kit) on each side of the break as shown in Figure 27-12, page 27-10.

•Cut the hose about 6 inches from the edge of the break and check the inside for damage. If you find any, cut the hose again to remove the damaged area.

•Wipe the end of the hose clean and dry.

•Put solvent on the inside of the hose, about 6 inches deep, and apply adhesive to the cut raw end. While the solvent is drying, put a coat of adhesive on the outside of the coupling sleeve.

•Place the sleeve in the hose immediately so that the adhesive can act as a lubricant.

•Use the banding tool, which comes with the repair kit, to put banding straps on the hose as shown in Figure 27-13, page 27-10.

•Bond the sleeve to the hose with three banding straps as shown in Figure 27-14, page 27-11.

•Apply the bands tightly, cut off the excess, and secure them with buckles. Stagger the buckles around the hose.

•Apply a coat of adhesive to the other cut end.

•Repeat the above steps on the other end of the hose.

•After you have completed both ends, connect the coupling sleeves with a grooved coupling, remove the hose clamps, and start pumping.

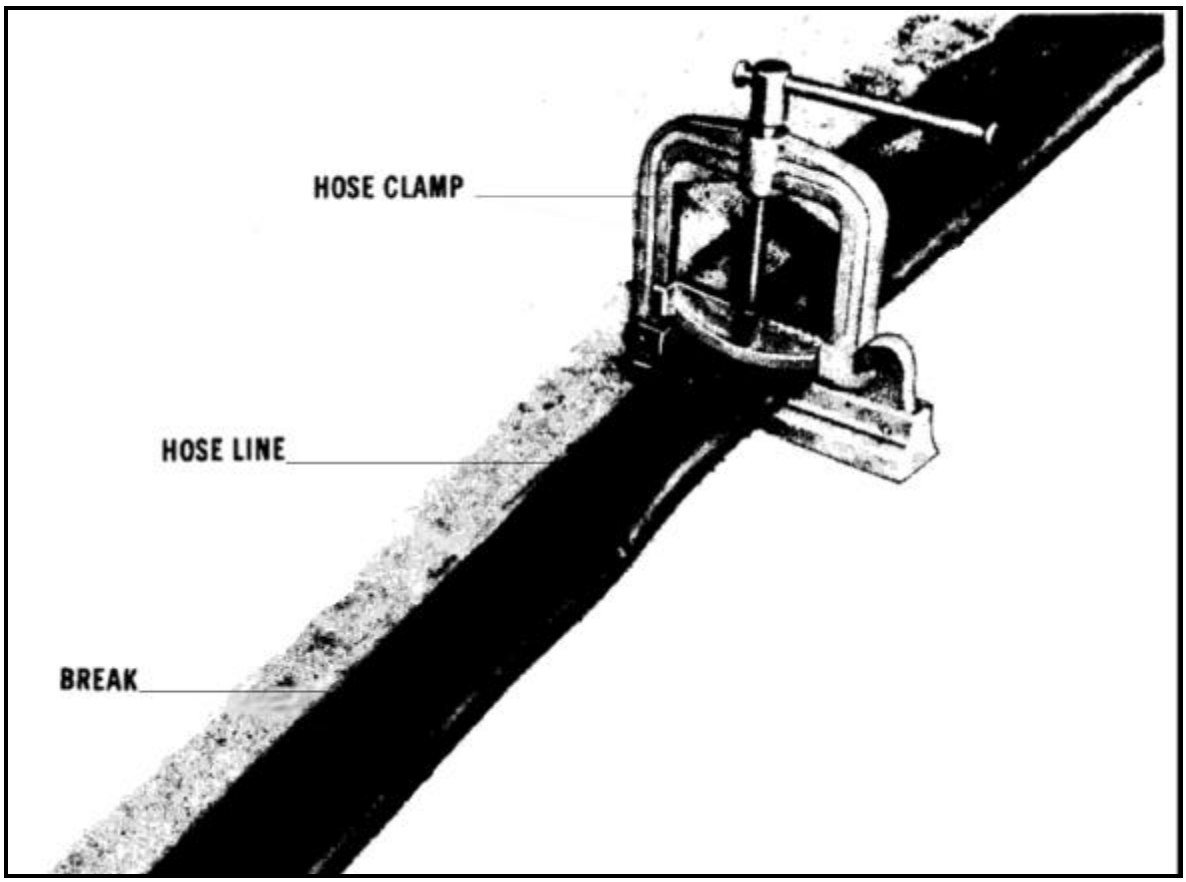

Figure 27-12. Clamp applied to hose

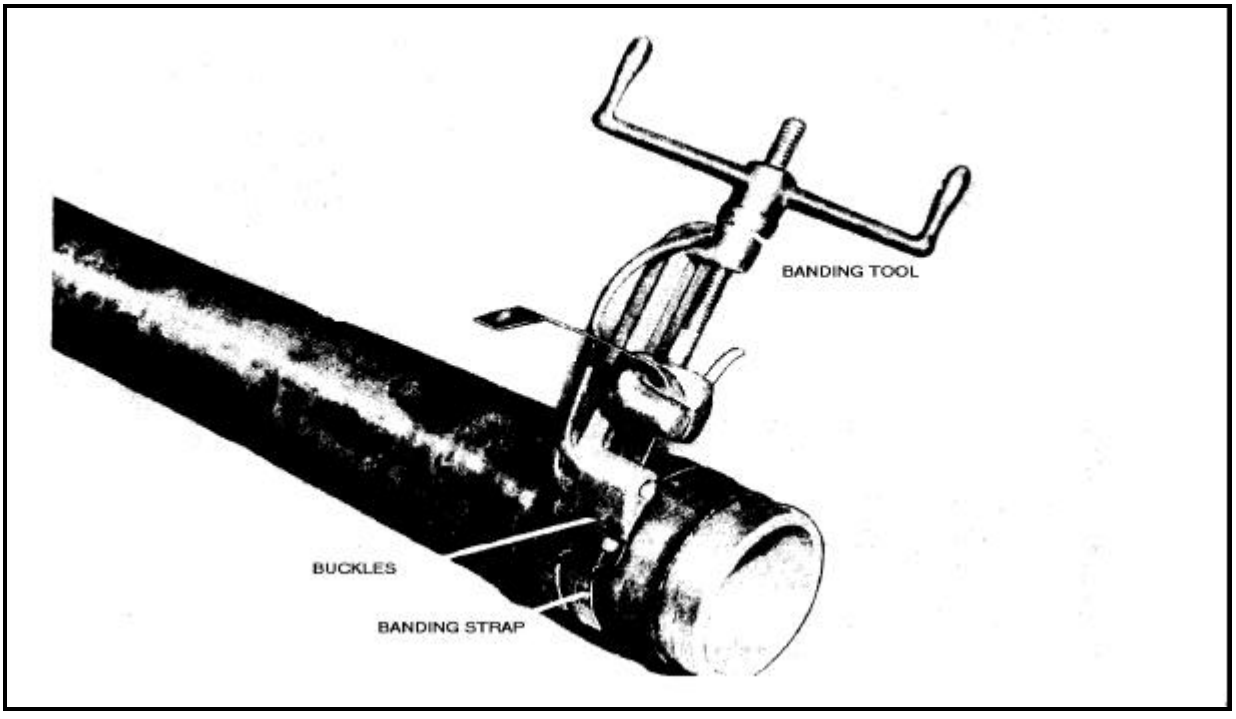

Figure 27-13. Coupling repair showing the use of the handing tool

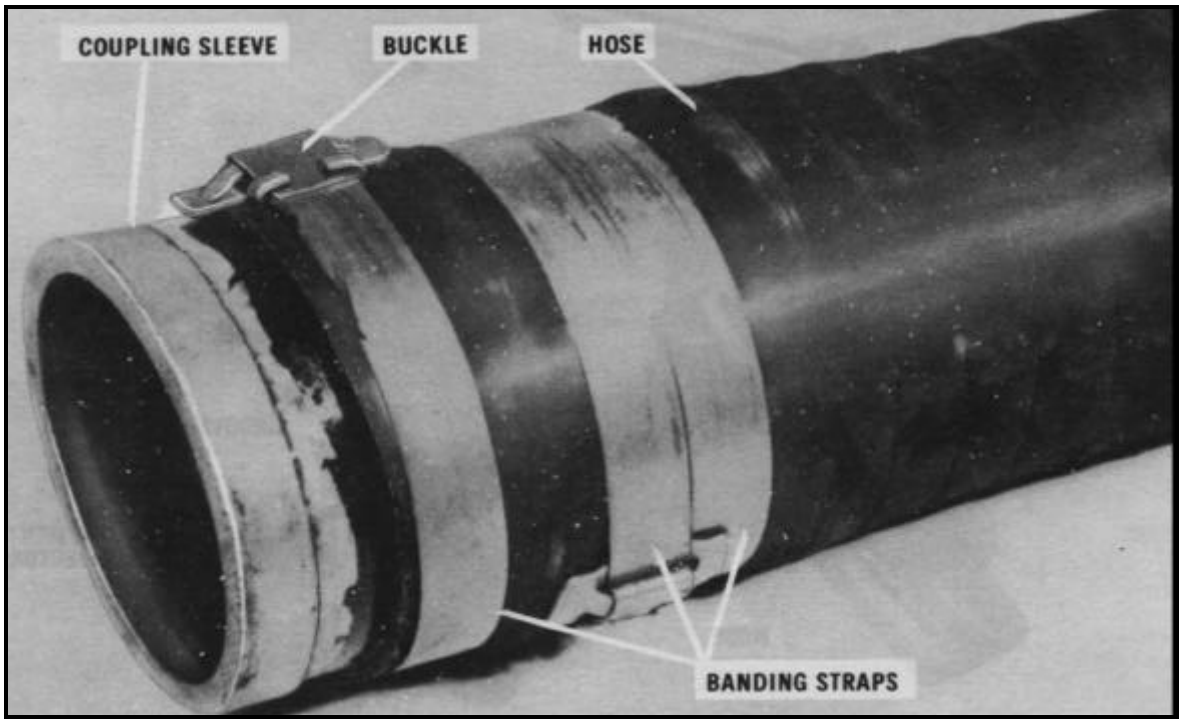

Figure 27-14. Completed coupling repair

HOSE EVACUATION

You cannot move the assault hoseline to a new location until you remove the fuel from the system and get all vapor and air out so that the hose is flat and ready to be packed. To do these things, use the displacement and evacuation kit.

Removing Fuel

Follow these steps to remove fuel from the system.

- Place a hose clamp on the section of hose just in front of the pump discharge manifold where the hoseline system starts.
- Disconnect the hose from the pump, and attach the ball injector, with the ball, to the end of the hose as shown in Figures 27-15, page 27-13 and 27-16, page 27-13.
- Move the pump to the other end of the assault hoseline, and connect it to the system.
- Put a second hose clamp on the end of the hose that connects to the pump suction manifold.
- Attach the ball receiver as shown in Figures 27-17, page 27-14 and 27-18, page 27-14**.** Connect the hose to the pump.
- Attach an air compressor hose to the ball injector at the start of the system, and inject compressed air into the hose behind the ball.
- Remove both hose clamps from the system. You usually need 20 to 25 PSI of air pressure to move the displacement ball at a satisfactory rate.
- Start the pump and keep it running to move the fuel forward an d into storage.

You can also remove fuel from the hoseline by gravity if you have a tank truck to drain the filled lines. Do not use water to displace fuel from the system.

Removing Vapor and Air

After the displacement ball has moved through the line, you must still remove the vapor and air from the assault hoseline. Follow these steps to remove vapor and air from the assault hoseline.

- Take the ball receiver off the end of the hoseline and put an airtight cap in its place. If you do not have a cap, you can seal the hose by bending it back on itself several times and tying it.
- Go to the beginning of the assault hoseline and disconnect the air compressor hose from the ball injector and attach the suction end of the air eductor as shown in Figure 27-19, page 27-15.
- Put the compressor hose on the inlet side of the eductor and turn on the air. This creates a vacuum and draws the vapor and air from the hoseline. You must operate the eductor about 10 minutes for each 1,000 feet of hose.
- When the hose flattens to a ribbon-like form, stop the air, fold back the end of the hose, and tie it.

Remove the ball inlet and air eductor. You are now ready to pack the hoseline into the flaking boxes.

DISPLACEMENT

The first thing you do when displacing the assault hoseline is to put all but one of the flaking boxes along the line at 1,000-foot intervals. Then, follow the procedures below.

- Keep one flaking box on the pickup vehicle.
- Back the vehicle over the hoseline as it lies on the ground.
- Have two crew members pick up the hose from the ground and pass it to two others on the vehicle.
- Start packing the hose into the flaking box by first placing the end of the hose, with the coupling attached, at the left front of the box (Figure 27-1, page 27-1).
- Lay the hose along the length of the left side of the box.
- Run the hose around the back of the box, and then make successive folds, from left to right, until you reach the front.
- Be sure to bend the hose so that it fills the entire width of the box.
- Ensure the folds are packed tightly together so that you can get 1,000 feet of hose in the plywood closures (Figure 27-1, page 27-1) and fabric retainers.
- If the temperature is below 40°F, you may have to use the hoseline packing kit to get the hose in the flaking box.
- When using the kit, make about 15 folds in the box. Then lay a plank across the face of the hose, attach the hose puller, and compress the hose in the box. Put one clamp on each side of the box to keep the hose in place, and then remove the plank and hose puller.
- Repeat this process about every 15 to 20 folds until the entire hose is packed in the flaking box.

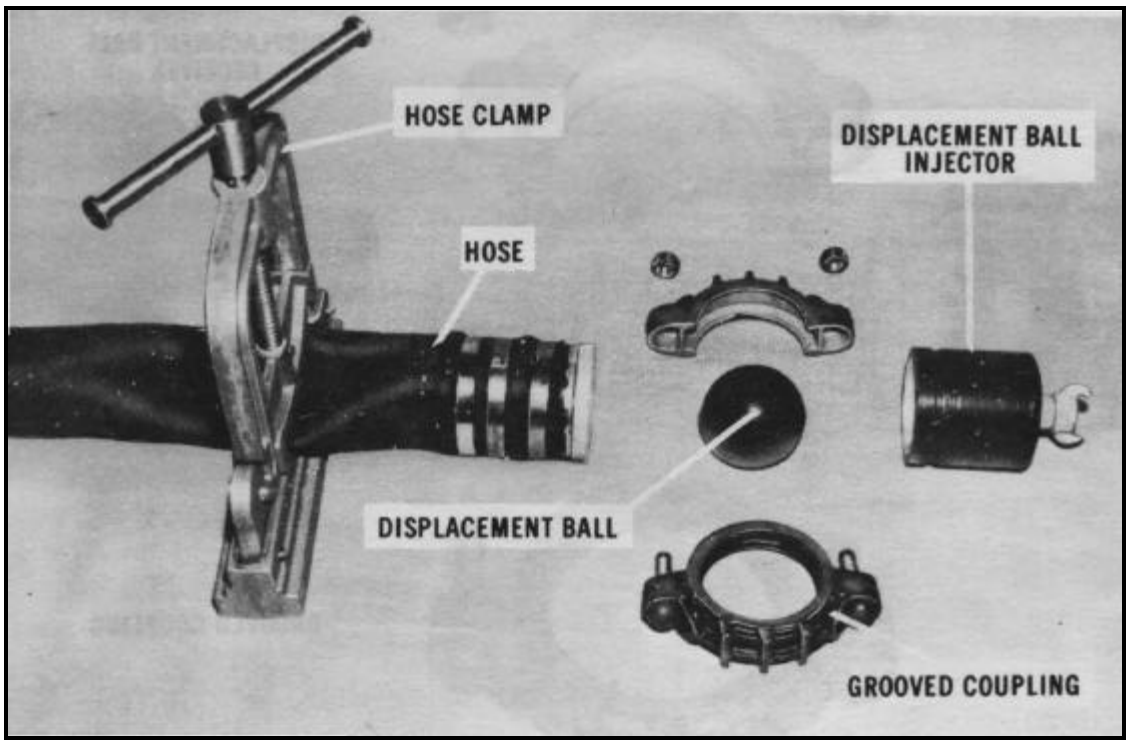

Figure 27-15. Unassembled ball injector

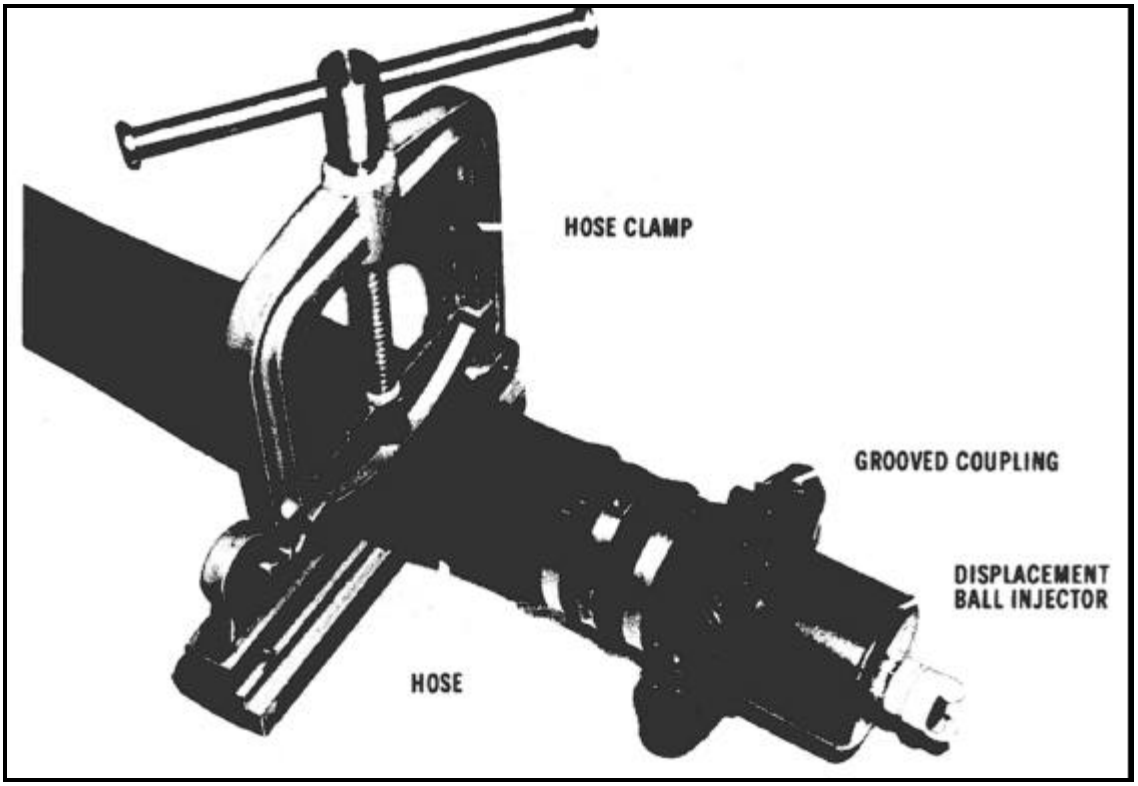

Figure 27-16. Assembled ball injector

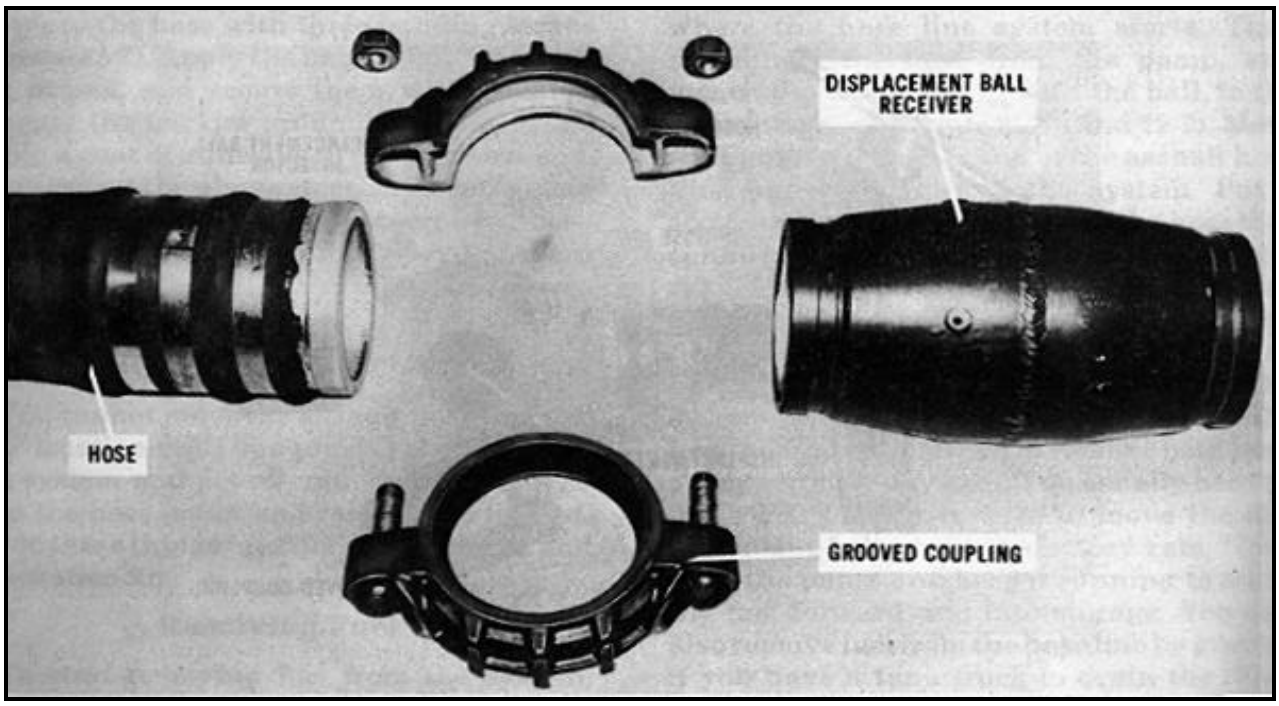

Figure 27-17. Unassembled ball receiver

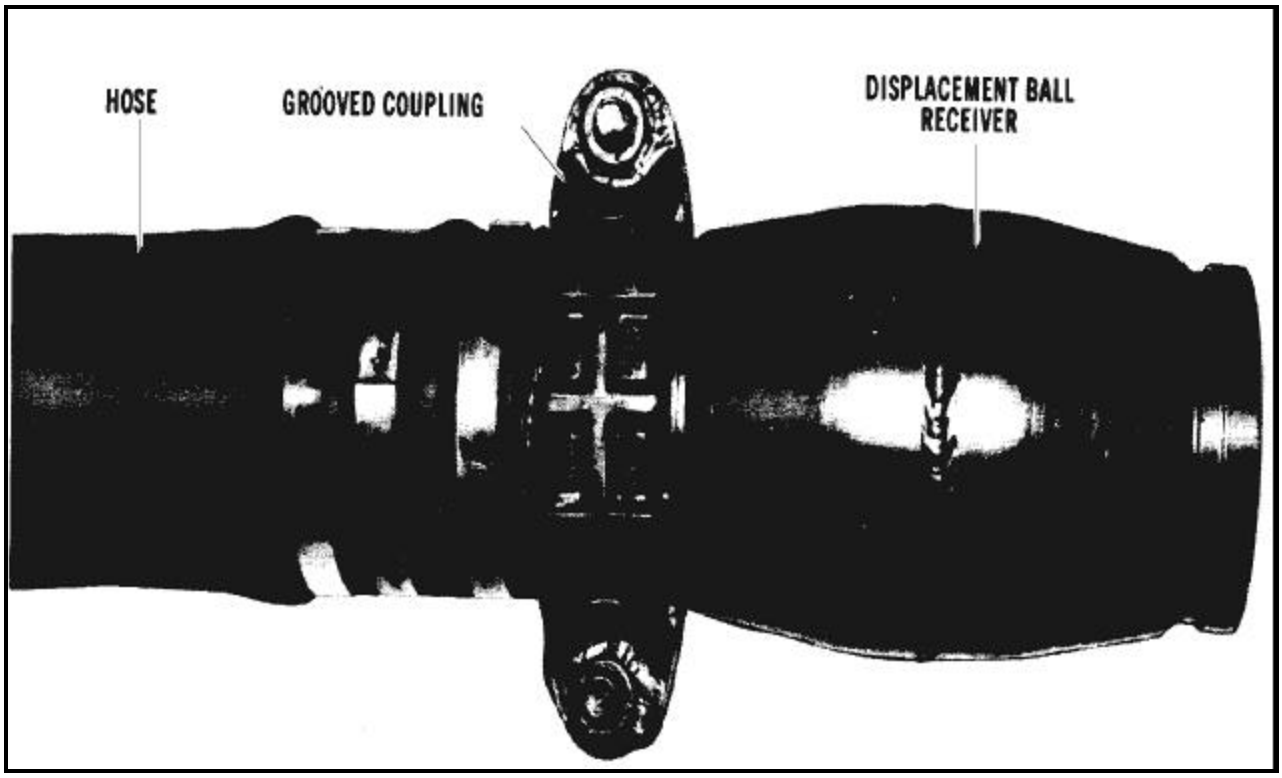

Figure 27-18. Assembled ball receiver

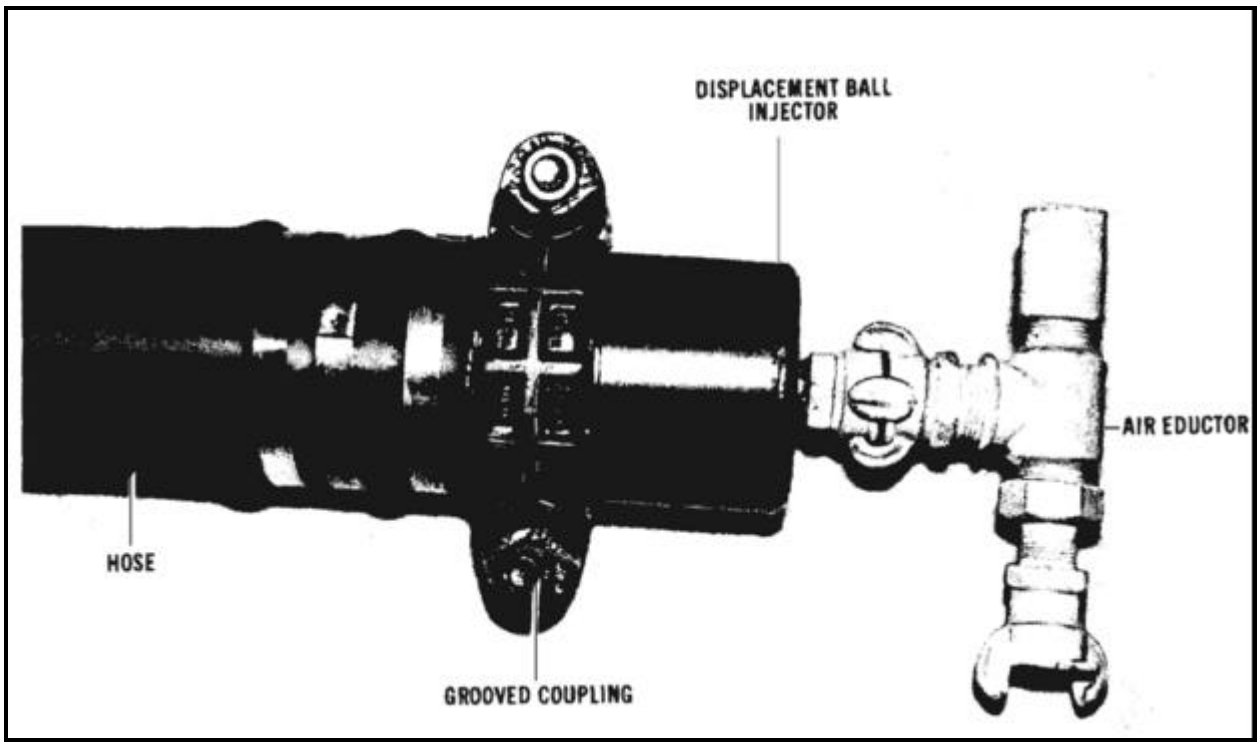

Figure 27-19. Air Eductor